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EXAMINER	
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ART UNIT	PAPER NUMBER
1637	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/965,644	Applicant(s) BITENSKY ET AL.
	Examiner Teresa E. Strzelecka	Art Unit 1637

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) *19-46* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to an amendment filed August 4, 2005. Claims 1-46 were previously pending, with claims 19-46 withdrawn from consideration. Applicants amended claims 1-4. Claims 1-46 are pending, claims 19-46 are withdrawn from consideration, and claims 1-18 will be examined.

2. Applicants should note that claims 3 and 18 have incorrect claim identifiers. In case of claim 3, which has been amended, the status identifier should be "Currently amended" rather than "Original", and in case of claim 18 it should be "Previously presented" rather than "Previously amended". The claims will be examined to expedite the prosecution, but Applicants should provide a response with correct claim identifiers for all claims.

3. Applicants' amendments overcame the rejection of claims 1-8 under 35 U.S.C. 112, second paragraph and rejection of claim 3 under 35 U.S.C. 102(b) as anticipated by Brody et al. All other rejections are maintained for reasons given in the "Response to Arguments" section below.

Response to Arguments

4. Applicant's arguments filed August 4, 2005 have been fully considered but they are not persuasive.

A) Regarding the rejection of claims 1-18 under 35 U.S.C. 102(b) as anticipated by Sutton et al., Applicants argue the following:

i) Applicants instrument is designed to perform static measurements on the cells after they have been trapped in the microchannels, which either are wedge-shaped or which comprise two sets of microchannels of different widths. Applicants proceed to show pictures of a device from a paper published in the Biophysical Journal in 2003 and compare the pictures with the figures from Sutton

et al. Applicants argue that the array of Sutton et al. does not comprise multiple rows of channels having different cross-sectional areas as depicted in Fig. 1 of Sutton et al.

ii) The array of Sutton et al., which has channels with different widths does not anticipate claim 2, which requires that the channels are arranged in rows forming a gradient for capturing cells.

iii) Sutton et al. do not teach wedge-shaped microchannels, but rather microchannels with stepped widths, which term is not synonymous with wedge-shaped.

iv) Sutton et al. teach away from the present instrument, since it is used for a method of cell transit through the channels, rather than cell capture.

B) Regarding the rejection of claims 1-18 under 35 U.S.C. 102(b) as anticipated by Brody et al., Applicants argue the following (only claims 1-3, 5-15, 17 and 18 were rejected):

i) Brody et al. teach cell analysis during their transit through microchannels, not cell capture, which is the purpose of the array of the invention.

ii) Brody et al. do not teach wedge-shaped channels or a configuration of gradient microchannels of decreasing widths, designed to capture red blood cells.

Regarding A), i) and iv), as explained in the previous office action, the claimed structure must be structurally different from the prior art, not in terms of the intended use or a manner of operating the device (MPEP 2114):

MPEP 2114

> **APPARATUS CLAIMS MUST BE STRUCTURALLY DISTINGUISHABLE FROM THE PRIOR ART**
>
> While features of an apparatus may be recited either structurally or functionally, claims< directed to >an< apparatus must be distinguished from the prior art in terms of structure rather than function. >*In re Schreiber*, 128 F.3d 1473, 1477-78, 44

USPQ2d 1429, 1431-32 (Fed. Cir. 1997) (The absence of a disclosure in a prior art reference relating to function did not defeat the Board's finding of anticipation of claimed apparatus because the limitations at issue were found to be inherent in the prior art reference); see also *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971);< *In re Danly,* 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). "[A]pparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original).

MANNER OF OPERATING THE DEVICE DOES NOT DIFFERENTIATE APPARATUS CLAIM FROM THE PRIOR ART

A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) (The preamble of claim 1 recited that the apparatus was "for mixing flowing developer material" and the body of the claim recited "means for mixing ..., said mixing means being stationary and completely submerged in the developer material". The claim was rejected over a reference which taught all the structural limitations of the claim for the intended use of mixing flowing developer. However, the mixer was only partially submerged in the developer material. The Board held that the amount of submersion is immaterial to the structure of the mixer and thus the claim was properly rejected.).

Therefore, it is clear from the above that limitations of claim 1, for example, such as "wherein a cell enters the wider end of the wedge-shaped microchannel and is trapped as it traverses the microchannel" (lines 4-6), "whereby said first and second sets of microchannels are arranged to form a gradient for capturing said cell" (lines 9, 10) and "the plurality of microchannels has a geometric shape that traps the said cell as it traverses the microchannel, thereby trapping the cell in

a microchannel such that the cell does not leave the microchannel but is constrained by its shape to remain in the microchannel" constitute a manner of operating the device and its intended use, but does not result in a structural difference between the claimed device and the prior art, since Sutton et al. also teach microchannels with entry and exit ports, and with channel dimension within the ranges specified by Applicants. It is also not improbable that some of the cells of Sutton et al. would also be trapped in the microchannels.

Further, contrary to Applicants' statements that Sutton et al. do not teach multiple rows of channels having different cross-sectional areas, which is supposedly supported by Fig. 1 of Sutton, Applicants neglected to print the figure legend to Fig. 1 of Sutton et al., which states the following: "Detail of a multiwidth channel array showing groups of six channels, each taking a width between 3.0 and 4.0 μm, in 0.2 μm increments." (page 274 of Sutton et al.). Therefore, Sutton et al. teach six sets of microchannels with different cross-sectional areas. Also, Applicants compare the figures of Sutton et al. not to the drawings filed with the specification but to the drawings of a paper filed nearly three years after the priority date of the instant application, which, therefore, cannot be considered as evidence of the claimed instrument's structure.

Regarding ii), Applicants did not define the terms "gradient array" or "arranged to form a gradient", therefore this term is given its broadest reasonable interpretation. In this case, since the widths of the channels of Sutton et al. form a gradient from 3.0 and 4.0 μm, the array can be considered to be a gradient array.

Regarding iii), Applicants did not define the term "wedge-shaped". A wedge is commonly defined as a three-dimensional object "that is triangular in cross section", therefore, in which one of the dimensions is variable, while the other two remain constant. Therefore, since Sutton et al. refers to stepped widths of the microchannels, which means either decreasing or increasing the width of

the microchannel, it would make the microchannels wedge-shaped. Further, since Applicants did not specify that the microchannel has to be wedge-shaped along its entire length, a microchannel with a variable width along a part of its length would also be considered "wedge-shaped".

The final conclusion of the above considerations is that in structure the array of Sutton et al. anticipates the claimed structure of the instant invention. The rejection is maintained.

Regarding B), i) Applicants reiterated the statement that the purpose of using the array of Brody et al. is different from the purpose of using the claimed instrument. This argument was addressed above. Regarding ii), claim 4 was not rejected over Brody et al. As to the argument about lack of gradient arrangement of microchannels, the structure of the device of Brody et al. is very similar to the structure of the Sutton et al. instrument, with four groups of two microchannels each, with widths varying between 2.5 and 4 μm in 0.5 μm increments (Fig. 1). Therefore, again, the array can be considered as a gradient array, since the widths of channels vary in a gradient fashion.

The rejection is maintained for claims 1, 2, 5-15, 17 and 18.

Claim Interpretation

5. The following limitations of claim 1: "wherein a cell enters the wider end of the wedge-shaped microchannel and is trapped as it traverses the microchannel" (lines 4-6), "whereby said first and second sets of microchannels are arranged to form a gradient for capturing said cell" (lines 9, 10) and "the plurality of microchannels has a geometric shape that traps the said cell as it traverses the microchannel, thereby trapping the cell in a microchannel such that the cell does not leave the microchannel but is constrained by its shape to remain in the microchannel" and claim 2: "for capturing an individual cell therein" (lines 1, 2), and "for capturing said cell " (line 11) constitute a

manner of operating the device and its intended use, therefore they are not taken into account when comparing the claimed subject matter with prior art (see MPEP 2114 cited above).

6. The phrases of claim 1 "microchannels are arranged to form a gradient" and of claim 2 "said array is designed as a gradient array" have not been defined by Applicants, therefore any arrangement of microchannels is considered to be a "gradient".

7. Applicants did not define the term "wedge-shaped". A wedge is commonly defined as a three-dimensional object "that is triangular in cross section", therefore, in which one of the dimensions, e.g. width, is variable, while the other two remain constant. Applicants did not specify that the microchannel has to be wedge-shaped along its entire length, therefore a microchannel with a variable width along a part of its length would also be considered "wedge-shaped".

8. Applicants did not define a numerical range for the term "about" with respect to channel dimensions, therefore any dimensions within reasonable numerical value difference from the given dimension will be considered as anticipating the particular dimension.

9. Applicants did not define the terms "safety channels" or "shunt channels", therefore any channel is considered to anticipate these limitations.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Sutton et al. (Microvascular Res., vol. 53, pp. 272-281, 1997; cited in the previous office action).

Regarding claims 1 and 2, Sutton et al. teach an array comprising a plurality of microchannels, where each channel includes an entry portion and an exit portion (Fig. 1; page 274, fifth paragraph). Sutton et al. teach an array consisting of groups of six channels, each having a width between 3.0 and 4.0 μm in 0.2 μm increments and a constant depth of 3.2 μm (Fig. 1; page 278, second paragraph). As can be seen in Fig. 1, there are 24 microchannels on the array, therefore, there are four channels in each width group, anticipating the limitations of at least first and second set of microchannels with different cross-sectional areas, since differences in width at constant depth result in different cross-sections of the channels. Since the arrangement of the microchannels is such that their widths decrease from one side of the device to the other side, this arrangement is considered to be a gradient arrangement.

Regarding claim 3, Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph), anticipating the ranges of depth being between 0.8 to 6 μm, length of about 10 to about 210 μm, an entry portion with width of about 2.5 to about 25 μm and an exit width of about 0.5 to about 7 μm. Sutton et al. teach channels with stepped widths (page 280, second paragraph), therefore they teach wedge-shaped channels.

Regarding claim 4, Sutton et al. teach channels with stepped widths (page 280, second paragraph), therefore they teach wedge-shaped channels.

Regarding claims 5-8, Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph), anticipating the ranges of depth being about 3.4 μm (claim 5), length about 60 μm (claim 5), about 35 μm (claim 6), about 100 μm (claim 7) and about 16 μm (claim 8), an entry

portion with width of about 3.7 μm (claim 5), about 3.6 μm (claims 6 and 8), about 4.5 μm (claim 7) and an exit width of about 1.5 μm (claims 5 and 7) and about 1.4 μm (claims 6 and 8).

Regarding claims 9 and 10, Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph), in fluid communication with each other, anticipating the length of about 0.5 to about 30 μm, and width of about 0.5 to about 1.5 μm.

Regarding claim 11, Sutton et al. teach microchannels designed for constant pressure flow (page 275, fifth paragraph).

Regarding claims 12 and 13, Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph), anticipating the length of about 10 to about 100 μm.

Regarding claim 14, Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph) designed to deform the cells as they pass through them (Fig. 5; page 280, second paragraph).

Regarding claim 15, Sutton et al. teach a microfluidic system for moving the cells through microchannels (page 275, paragraphs 2-4; Fig.3).

Regarding claim 16, Sutton et al. teach a pump for driving the cells through the channels (page 275, fourth paragraph).

Regarding claim 17, Sutton et al. teach microchannels with dimensions on the same scale as human capillaries (Abstract; page 280, fifth paragraph).

Regarding claim 18, Sutton et al. teach an array comprising a plurality of microchannels, where each channel includes an entry portion and an exit portion (Fig. 1; page 274, fifth paragraph). Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph), anticipating the ranges of length of about 40 to about 100 μm, an entry portion with width of about 3 to about 9 μm and an exit width of about 0.5 to about 2 μm.

12. Claims 1, 2, 5-15, 17 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Brody et al. (Biophysical J., vol. 68, pp. 2224-2232, 1995; cited in the previous office action).

Regarding claims 1 and 2, Brody et al. teach an array comprising a plurality of microchannels, where each channel includes an entry portion and an exit portion (Fig. 1; page 2225, ninth paragraph). Brody et al. teach an array consisting of groups of channels, each having a width between 2.5 and 4.0 μm in 0.5 μm increments and a constant depth of 4 μm (Fig. 1; page 2225, ninth paragraph). As can be seen in Fig. 1, there are eight microchannels on the array, therefore, there are two channels in each width group, anticipating the limitations of at least first and second set of microchannels with different cross-sectional areas, since differences in width at constant depth result in different cross-sections of the channels. Since the arrangement of the microchannels is such that their widths decrease from one side of the device to the other side, this arrangement is considered to be a gradient arrangement.

Regarding claims 5-8, Brody et al. teach microchannels with a depth of 4.0 μm, width between 2.5 and 4.0 μm in 0.5 μm increments and length of 20 μm (Fig. 1; page 2225, ninth paragraph), anticipating the ranges of depth being about 3.4 μm (claim 5), length about 60 μm (claim 5), about 35 μm (claim 6), about 100 μm (claim 7) and about 16 μm (claim 8), an entry

portion with width of about 3.7 μm (claim 5), about 3.6 μm (claims 6 and 8), about 4.5 μm (claim 7) and an exit width of about 1.5 μm (claims 5 and 7) and about 1.4 μm (claims 6 and 8).

Regarding claims 9 and 10, Brody et al. teach microchannels with a depth of 4.0 μm, width between 2.5 and 4.0 μm in 0.5 μm increments and length of 20 μm (Fig. 1; page 2225, ninth paragraph), in fluid communication with each other, anticipating the length of about 0.5 to about 30 μm, and width of about 0.5 to about 1.5 μm.

Regarding claim 11, Brody et al. teach microchannels designed for constant pressure flow (page 2225, eighth paragraph).

Regarding claims 12 and 13, Brody et al. teach microchannels with a depth of 4.0 μm, width between 2.5 and 4.0 μm in 0.5 μm increments and length of 20 μm (Fig. 1; page 2225, ninth paragraph), anticipating the length of about 10 to about 100 μm.

Regarding claim 14, Brody et al. teach microchannels with a depth of 4.0 μm, width between 2.5 and 4.0 μm in 0.5 μm increments and length of 20 μm (Fig. 1; page 2225, ninth paragraph) designed to deform the cells as they pass through them (Fig. 2; page 2224, last paragraph).

Regarding claim 15, Brody et al. teach a pressure gradient system for moving the cells through microchannels (Fig. 1 and Fig. 3).

Regarding claim 17, Brody et al. teach microchannels with dimensions on the same scale as human capillaries (Abstract; page 2224, first paragraph).

Regarding claim 18, Brody et al. teach an array comprising a plurality of microchannels, where each channel includes an entry portion and an exit portion (Fig. 1; page 2225, ninth paragraph). Brody et al. teach microchannels with a depth of 4.0 μm, width between 2.5 and 4.0

μm in 0.5 μm increments and length of 20 μm (Fig. 1; page 2225, ninth paragraph), anticipating the ranges of length of about 10 to about 60 μm, an entry portion with width of about 3 to about 6 μm and an exit width of about 0.5 to about 2 μm.

13. No claims are allowed.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Teresa E. Strzelecka whose telephone number is (571) 272-0789. The examiner can normally be reached on M-F (8:30-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on (571) 272-0782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TERESA STRZELECKA
PATENT EXAMINER
Teresa Strzelecka

October 12, 2005